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Bee-Culture in Cottage Hives.

No. 5.

We remarked in the preceding number that, in building up an apiary, the multiplication of colonies must ever be regarded as a means, and not as an end. The intelligent bee-keeper uses it merely for the purpose of procuring in a speedy, cheap, and gratifying manner, the full number of stocks which he proposes to keep permanently; and thenceforward subordinates it to his main object, the maintenance of a productive and profitable apiary. Unless he adopts and inflexibly adheres to this as a fundamental principle, he must forego all expectation of abundant honey harvests, making up his mind to feed to weak swarms and reduced parent stocks, the surplus honey which his non-swarming hives may yield. It is true that the number of stocks can be rapidly increased by swarming and driving, but regular profit is derived not from the number, but from the quality of the stocks he possesses. An irregular, unsystematic mode of management, by which the apiarian becomes dependent in large measure on his bees, instead of having them dependent on him, is precisely the prevalent and predominant evil among bee-keepers, and is sure to result in the swift destruction of their apiaries. Undoubtedly years occur when, even in poor honey districts, bees have an overweening propensity to swarm; but those are not the richest honey-yielding years, for in the latter, the bees indulging their uncontrolable greed for honey, devote all their energies to the accumulation of stores, filling up the cells so rapidly and so generally that little space is left in which the queen can deposit eggs. Thus swarming is prevented at a time when the wants of young colonies could be most easily provided for. It is altogether a mistake to suppose that, in this matter of swarming, the bees have an unerring guide in their natural instincts; for it not unfrequently happens that the weather suddenly changes and supplies fail a few days after a swarm has issued, and it must then be liberally fed or it will perish. This is one reason why the swarm, whether it came with our consent or not, must always be set in the place where the parent stock stood, and the latter removed to a new location.

We have already said that when increase of colonies is our object, whether by natural swarms or by artificial process, the stocks must be managed differently from what is proper when they are designed to be made honey producers. We have only to add now to what was then stated, that the annual increase must be limited to one swarm—whether natural or artificial—from each stock; and that all after-swarming must be absolutely prevented. This rule is not to be restricted to poor honey districts only, but must be rigidly adhered to also in those which usually yield fair honey harvests. Only in first-rate honey districts can a deviation from it be permitted, and it must be borne in mind that such districts are never found where highly improved agriculture has been introduced and established. In all others the governing principle must be inflexibly enforced, not to permit after-swarming in any case. Without this, bee-culture can never be made permanently a source of profit, but will speedily become a losing business, as experience has frequently shown.

After a prime swarm has issued, after-swarms usually follow, if the parent stock is not transferred to a new location; but they come very irregularly. When reading the treatises of even experienced bee-keepers, we are led to imagine that this whole matter of swarming proceeds as it were by system, and many of them name the very day when the after-swarms will make their appearance. Generally speaking, no such regularity is observed, and the novice will soon discover that all calculations of this kind are deceptive. He will be told, also, by some, that the first after-swarm is always accompanied by a single queen only, because all her rivals are guarded in their cells by the workers, and not permitted to emerge till the first-born has departed. This, too, he will frequently find to be erroneous. The first after-swarm will sometimes return and re-enter the parent hive, after having gone through the usual demonstrations of actual swarming. The result is then great tumult and confusion in the

hive, during which other mature young queens emerge, and internal discord is engendered, each queen soon having its own party of adherents. I have often been annoyed by the behavior of such after-swarms, issuing and returning four or five times on the same day, ejecting on each occasion most of the honey with which they were gorged. Besides this loss, there is, moreover, the loss of much precious time; and when the swarm actually leaves, we cannot feel assured that the trouble and vexation is ended.

After-swarming must therefore be prevented, and this can be done by removing the stock from which a prime swarm has come, to some other location in the apiary, and placing the swarm where the parent stock stood. With very rare exceptions this process will prove efficient, and it is conceded by all that the prime swarm is thereby greatly strengthened by returning bees, and will be more sure to thrive than one set elsewhere, while the parent stock retains its old position. The only question is whether the latter is not unduly weakened by the removal, since it loses nearly all the foraging bees, except such as adhere to the brood combs, as none that leave the hive on the ensuing three days in quest of either honey, pollen, or water, will return to it, but seek the old location and join the swarm. Long experience has taught us, however, that no real injury results therefrom, because for nearly three weeks after the departure of the swarm about a thousand bees emerge daily from the brood cells, and several thousand of the old ones, engaged in nursing the brood, remained behind when the swarm left. Nor is it likely to happen that the brood will be destroyed from want of adequate warmth, since the temperature is usually high at the swarming season, and the brood is known to be remarkably tenacious of life.

Since 1835, when we adopted this process, not a hive in our apiary thus transposed has become queenless; but it is indispensable that the transposition be made *immediately* after hiving the swarm. We have frequently been able to catch the queen as she came out with the swarm. In such cases we remove the hive as soon as the swarm has issued, and set an empty one in its place to receive the swarm when it returns, as it quickly will on missing the queen. As soon as a considerable number of bees begin to fan at the entrance of this hive, we gently place the queen among them, and thus secure the swarm without the trouble of hiving it or the risk of its absconding.

The Baron of Berlepsch suggests that a wet cloth should be laid over the opening in the top of the parent hive, and kept constantly damp, because the bees require much water for their brood, and during the first two or three days those going for it fail to return. It may be a good, prudential measure, though we have never resorted to it.

It has also been proposed to remove some strong stock which has not swarmed, and does not appear likely to do so, and set in its place the parent hive from which a swarm has issued. The latter would thus be reinforced from the surplus population of the removed stock, and be enabled to furnish a strong after-swarm. But this would, in fact, be promoting and not preventing after-swarming, and is thus diametrically opposed to the system which we advocate. Certain it is that of the large number of parent stocks which we have transposed in this manner, not one even became enfeebled, and all of them proved to be excellent honey-stocks in the following year. They will recruit sooner, and more rarely become queenless, than if they had remained in their original position.

The result of all these observations is that the multiplication of stocks must be carried on very gradually in agricultural districts, and must cease as soon as the bee-keeper has obtained the full number of stocks which he purposes should constitute his apiary. Unless he does this, he must not expect to derive profit from his bees.

Natural Swarming.

None but populous and well-supplied colonies can produce early and large natural swarms. The chief means of promoting the issuing of such swarms is by stimulative feeding in the spring, and contracting the size of the hive. Of these we have already treated at large, and shall now merely add some special remarks.

1. Several German authors of distinction speak of *unprepared* prime swarms—that is, such as issue before queen cells have been built or capped. But since such swarms are regularly followed by after-swarms, and they always constitute exceptional cases, we do not deem them deserving of particular notice, any more than the Liliputian swarms described by Von Berlepsch, because these, too, are of rare occurrence in well-managed apiaries. We once found one of the latter description, which had settled on the leafless branch of a tree, in a globular mass not larger than an ordinary apple, but soon returned to the hive. A few hours later it issued again, and once more clustered on the tree. We now examined its hive, and found therein neither brood nor honey. It was literally a *mendicant swarm*, and thus in reality no swarm at all in the proper sense of the term, but a reduced and impoverished stock, constrained by famine to desert its home. Such usually seek admission in some better-supplied colony, and are almost invariably destroyed in the attempt. Whoever undertakes to winter weak stocks will frequently have the mortification to find some of them thus taking *French leave* as the spring approaches.

2. There are no certain signs of swarming, though prime swarms generally "hang out" for some time before they leave, occasionally covering the entire front of the hive, or hanging from the alighting board in a dense cluster. In hot weather this sometimes continues for weeks, and in the end no swarm issues. Even though drones are seen flying as early as ten o'clock in the forenoon, when the returning bees, honey and pollen laden, do not enter the hive, but mingle quietly with the outlying bees, and when individual workers are seen running wildly on the outlying mass, wagging their abdomens, all those appearances may prove to be deceptive. They are no certain indications that a swarm will issue on that day. The surest

sign—though still not a perfectly reliable one—is when the outlying bees suddenly withdraw into the hive and gorge themselves with honey. Yet even this sign is usually of little avail to the bee-keeper, as a premonitary hint, because it may occur in his absence, and in a moment the bees may reappear, rushing forth in a steady stream, and the swarming is almost as suddenly at an end; so that the sign is nearly useless if we are present, and of no value whatever if we are absent. The main matter is to keep watch, from moon to eve; and he who depends on natural swarming must do so perseveringly, or he may in an instant lose that which was long and anxiously looked for.

Whether a swarm has gone off unobserved can readily be determined by an inspection of the stock. If the bees no longer "hang out," if comparatively few enter or leave the hive, and work seems to be in a great measure suspended, we may conclude that a swarm has departed. A close search should then be instituted, as possibly the fugitives may still be found clustered somewhere in the neigborhood on a tree or a bush, because first swarms commonly settle and pause before taking their final departure. All these remarks, however, apply to first swarms only. In after-swarms the queens are generally heard *teeting* before they leave, but they issue more suddenly than first swarms, and are also much more disposed to decamp, the young queens being more agile than the old ones. Sometimes, however, the teeting is continued, at intervals, for several days, and still no swarm issues. Indeed, after-swarms rarely make their appearance before the ninth day after the prime swarm has left. But sometimes weeks elapse before after-swarming ceases. It may, however, be regarded as a sure indication that it is ended when young queens, either dead or expiring are found on the alighting board or in front of the hive, early in the morning, or when others make their escape from the hive, and are seen flying about the apiary. If the hive be then tipped up, clumps of bees may commonly be seen between the combs or on the bottom board, encasing supernumerary young queens doomed to destruction by suffocation or starvation.

When there are no trees in close proximity to the apiary, it may be advantageous to erect a few poles, previous to the swarming season, twelve or fifteen paces in front of the stands, and suspending therefrom, at an elevation of ten or twelve feet, some pieces of black oak bark, with the rough side turned towards the ground. Experienced bee-keepers allege that bees will readily settle and cluster on such suspended bark, and this may then be taken down for the more convenient hiving of the swarm.

3. It is scarcely necessary to remark that a supply of empty hives should be prepared before the swarming season comes, to receive the swarms. If they are to be painted, this should be done so early that they may become perfectly dry and free from smell; before they are used.

Prime swarms rarely attempt to abscond, usually settling on some tree or bush in the neighborhood of the apiary, unless indeed it be what is termed a *singing* swarm—that is, one issuing from a stock that changed or lost its queen early in the spring, and has been successful in rearing others. Such a swarm, having a young and unfecundated queen, and thus resembling perfectly an after-swarm in this respect, is apt, also, to be of the same vagrant disposition, especially if several queens accompany it. But even second swarms commonly settle before taking their final departure for parts unknown, and if then promptly attended to may easily be hived.

Squirting water or throwing sand among the swarming bees to induce them to settle, is seldom serviceable and may sometimes be injurious by inducing them to return hurriedly to the parent hive. It is better to look on patiently till they select a spot on which to cluster, and then let them congregate without interference, unless the place be one from which it would be very inconvenient to dislodge them for hiving.

4. When bees swarm, the bee-keeper should remain perfectly calm and collected. Swarms are generally very tractable if taken in hand immediately after they have clustered, and there is then no need of a bee-hat or veil, as they will not sting unless rudely treated. As soon as the mass of the bees have entered the hive prepared for them, it should immediately be removed to the place where it is intended it should remain permanently—that is, where the parent stock stood. The few individuals still out will then promptly rejoin it, and those returning from foraging will not be constrained to look for a home elsewhere. If any bees remain on the hiving cloth or sheet, this should be carried to the new hive, that these laggards, which are mostly young bees, may unite with the swarm, or they may be carried to the parent stock and allowed to enter there, if this has been greatly depopulated. They will aid in nursing the brood.

Where a large number of stocks are kept in one apiary, and they are managed in the ordinary manner—that is, not *managed* at all, but indulged in the "largest liberty," two or more swarms will sometimes issue simultaneously and cluster together. This rarely happens where the business is conducted systematically, for though in cottage bee-culture you cannot have command of the combs, you can still, to a great extent, control the bees, and subject them to your own regulations. On the system which we pursue and recommend, few stocks are permitted to swarm, and after-swarming is prevented by transposition. Hence we are seldom annoyed by double or triple clustering. But if it should occur, and one or more after-swarms unite with a first swarm, we put the whole in one large hive, and set it in a cool dark place, giving it ample ventilation, and on the following day remove it to the permanent stand designed for it.

But when several first swarms unite, and we desire to separate them, we proceed as follows: Hive them unitedly, then spread a large linen sheet on a level place or floor, and set thereon as many empty hives as there are swarms united, underlaying each with small wedges to elevate them sufficiently to permit the entrance of the

bees, and placing the hives nearly equidistant as far asunder as practicable. Now shake out on the sheet in front of each hive a portion of the bees, proceding thus from one hive to another, till a nearly equal division has been made. Then carry each hive to a dark chamber, and if the bees in each remain quiet, the operation has been successful, and they may, at dusk, be removed to their allotted stands. But if the bees, in any one of them, become restless, we must renew the process by shaking out the *quiet* portion once more, and letting them run into two separate hives again. As the number of bees is now much smaller, the queens may generally be seen moving forward in the crowd. If only one is seen, she should be gently seized and given to the hive which is restless and remains in the dark chamber. If only two swarms had clustered together, the division will now have been affected; but if three or more had united, we may have to repeat the process till all the queens have been separately secured. It requires an expert to perform this operation satisfactorily; and without the assistance of an experienced person we would not advise a novice to undertake it. When only two swarms unite, we never deem it expedient to separate them, as the united body is sure to constitute a good stock, worth much more than two weak ones.

5. Bees will sometimes continue to "hang out" for weeks without swarming. This is particularly vexatious when honey abounds, and a large number of workers are idling away their time. In such cases we add a super to the hive, or give the bees access to a surplus honey box, thus enlarging the room. But if the hive is populous, and the season favorable, we prefer to cut the matter short by driving out a swarm.

The most convenient mode of securing a first swarm is to capture the queen as she issues from the hive. She commonly makes her appearance when half the swarm is out. There is then usually a brief pause in the outpouring stream; then she issues, accompanied by a few workers, and may be caught on the alighting board. As she should not be handled roughly, those who fear she might be injured may secure her unharmed by inverting a gill glass over her, and shoving a small piece of tin or a thin card between the glass and the alighting board, and thus confining her. When the entire swarm has issued, the hive should immediately be removed to some other location, and an empty one resembling it substituted for it. Then when the returning bees are crowding on its front, liberate the queen at the entrance, and they will promptly take possession of their new home: though, if there is an opening in the top of the hive, we prefer introducing the queen there, and immediately closing it.

6. Afterswarms, as has already been stated, are to be prevented by removing the parent hive, and setting the first swarm in its place. But what is to be done when this has been neglected, and an after-swarm issued; and if, moreover, we do not know from which hive the after-swarm came? It is easy to ascertain whence it came, if a few hundred of the bees be put in a narrow-necked bottle, and its mouth be presented successively to different hives. They will refuse to enter any of those from which they did not come, but will at once commence fanning and eagerly rejoin their parent stock. They must not, however, be reunited with the latter, as that would almost certainly lead to the issue of another after-swarm. Place it where the parent hive stood, and give the latter a new location, as in the case of a first swarm. It may, however, be advantageously united with some other colony, thereby strengthening this, and avoiding the probable vexation of having to nurse a feeble stock.

The process is as follows: The swarm should be hived in a box or basket in the usual manner, and set in a cool, dark chamber till evening. Meanwhile dig a hole in your yard or garden of such dimensions as suit the size of the box or hive which contains the swarm and that of the stock to which it is intended to be united, and six or eight inches deep. Soon after dusk carry both hives thither, set that containing the swarm on the pit, and by stricking a smart blow on it with your hand, cause the swarm to drop into it. Instantly throwing the empty hive aside, lift the other from its bottom board, and set it over the pit, closing any holes or openings there may chance to be between the hive and the ground by covering the line of junction with a strip of cloth or a napkin. The bees of the swarm will at once begin to hum, and immediately ascend and join the colony placed over them. Let them so remain till next morning, and then replace the hive on its former stand. We have often removed them the same evening as soon as the bees had ceased humming and were quiet. In this process of uniting it is indispensable that the hive to which a swarm is to be added, should be already at least partially filled with combs, else both queens may be destroyed. If it contains combs, its queen will be as secure therein as in a kind of fortress, and only the one pertaining to the swarm will be destroyed as supernumerary. This process, first recommended by *Spitzner*, we have invariably found efficient. It was known and practiced in Thuringia for more than a century.

7. After-swarms, like stocks from which swarms have issued, have young queens which must leave their hives in order to become fertile, and hence are more liable to become queenless than first swarms and old stocks which fail to produce swarms. We have never known an instance, in our apiary, where a first swarm became queenless. On the contrary, stocks that have produced a succession of swarms the same season are very apt to prove queenless in the end. These two kinds of colonies consequently demand constant and close supervision during the swarming season, and for some weeks after; and the bee-keeper should at that period carefully avoid standing in front of such hives, so as to obstruct the flight of the bees, particularly in the afternoons of fine days, as thereby queens may be disconcerted and lost.

8. We may finally advert to a circumstance sometimes observed in the swarming season. Bees are then occasionally seen pass in and out of crevices in walls, fissures in buildings, or holes in hollow trees, frequenting such places

from day to day, but always forsaking them at evening. These are scouts or fourier bees, busied in seeking and preparing quarters for some inchoate swarm, which is sure to establish itself there, if not seasonably arrested by the bee-keeper when it makes its appearance. By sprinkling some of these scouts with meal, we may trace them to their home, and thus not only learn from which hive a swarm is to be expected, but also be fully prepared for its reception when it issues.

Artificial Swarming.

Swammerdam already, in his "*Bible of Nature*," mentioned that an intelligent bee-keeper in his day possessed the art of supplying himself with queen bees at pleasure, and of producing four times as many swarms annually as were usually obtained in his cold district. *Græwell*, in his "*Brandeburgian Approved Bee-culture*," (Berlin, 1762,) taught how to make swarms and divide colonies, and in 1770, *Schirach* published a special treatise on the art of making artificial swarms. Then followed a large number of publications discussing the subject more fully, and suggesting improved processes. But all these are now obsolete, having, with the sole exception of division by driving, proved worthless or injurious.

The hive best adapted for the multiplication of colonies by artificial processes is undoubtedly the movable comb hive, because it enables us to take out combs containing brood, honey, and pollen at pleasure, and to furnish each artificial colony with such portions and proportions of each of these as seem to be required; and even to select brood combs containing sealed queen cells and worker brood nearly mature. It also enables us to select the requisite materials from different hives, and taking from each just that which it is best able to spare.

The mode of dividing stocks by severing one or more ekes or sections from a hive by means of a thin wire, deserves to be condemned and rejected as causing a lamentable destruction of bees and brood. No sensible bee-keeper any longer resorts to it. Even that of using hives virtually divisible into two equal parts, though at first highly commended, has long since been abandoned, as it was found impracticable to divide the bees, honey and brood combs equally; and in one or the other of the divisions the experiment was sure to prove a dead failure.

Where common cottage hives, or hives with immovable combs are used, there is only one sure mode of artificial multiplication—that is, by driving out the first swarms when these do not naturally issue early in the season. But the standing rule, to cease multiplying as soon as the apiary contains the normal number of stocks we purpose keeping, must be rigidly adhered to. The means by which such normal number may be reached safely and early, have already been explained. But when once he has supplies of honey at command, and can furnish hives with empty combs and the needed stores, the beginner had better buy from less provident neighbors, such afterswarms as have fertile queens, and transfer them to his own ready furnished hive. If such a colony; with its added supplies, should cost him three dollars, it will still be cheaper than to permit second swarms to issue from his own stocks. To make artificial colonies himself requires care and labor, much watchful attention, and considerable skill in manipulating, and yet not unfrequently results in failure.

Knauff proposed to improve Schirach's method of multiplying by supering the hive in which the brood combs were taken, on the inverted hive from which the bees were to be transferred. If the hives are precisely alike in size, so that no vacancies occur between them, a mass of bees will rise and cluster on the brood combs during the night, while thus united; and early next morning they may be parted, the new colony set in place of the parent stock, and the latter removed elsewhere. But this, too, was found to be objectionable, as the new colony which contained only some brood and bees seldom prospered, and ofttimes failed to rear a queen. Even if one or more sealed queen cells were given to it, the impatience of the workers usually caused their destruction before reaching maturity.

In the case of a large stock, *Ritter* recommends a somewhat similar process. The front of the hive is to be removed, and replaced by an eke or box of suitable size, and furnished with worker comb. A week after, this may be taken away and will contain bees and brood sufficient to form a nucleus, which, by transposition with the parent hive, will be at once placed in a thriving condition. But this method also is liable to various objections. If it should happen that the old queen is in the added box or eke at the time of the removal, the parent stock may become queenless, and unable to supply their loss from the want of suitable worker brood; and if she is still in the hive proper, then the intended nucleus may not have a sufficient supply of honey to maintain itself, should unfavorable weather intervene while rearing a young queen.

But if for sake of the experiment it be preferred to increase the number of stocks by division, then select a populous colony well supplied with honey about the first of May, and set it on an eke or sectional hive eight or ten inches high, furnished with clear worker comb, taking care that the direction of these combs shall cross those in the main hive. About the first of June the eke will contain a large amount of brood in various stages; then, by blowing a little smoke in the entrance, the queen will be driven up into the combs above, the eke can be separated and treated as a nuclues after the main hive is removed to a new stand. The main object here is to retain the queen in her old home, and that there should still remain in it a sufficiency of sealed worker brood to recruit the population after the removal. The nucleus should receive a super containing honey in worker combs, to secure it against starvation in bad weather. This, too, is a troublesome mode of operating, and is apt to fail in the hands of the inexpert.

We greatly prefer division by driving to any other mode; and if this be resorted to when by the increase of population in spring, the bees are

beginning to be constrained to "hang out" at night, it can be expeditiously done, and seldom fails to be successful. First drive in the bees by a few whiffs of smoke, then remove the hive some twenty or thirty paces from the stand, invert it and set over it an empty hive as nearly of the same size as may be, and tie a strip of muslin around them at the line of junction, to confine the bees during the operation. Now take two sticks or light mallets and commence tapping or drumming below near the now inverted top of the hive. Continue to do so five or six minutes; and after pausing a few moments resume drumming, passing slowly around the sides of the hive upwards, occasionally recommencing below. Gorging themselves with honey after their first alarm, the bees will commence humming and ascend in a regular stream into the upper or empty hive, usually accompanied by the queen. In twenty or twenty-five minutes from the commencement of the drumming the exodus will be complete; and if it is designed that the driven swarm shall remain in the hive in which it then is, this may at once be set in place of the parent stock, and the latter removed to a new location. Should several days of bad weather ensue, preventing the bees from flying, the driven swarm should be fed with honey; and the parent hive should have some water given it. An empty decoy hive should be substituted for the parent hive, when it is removed for drumming. The returning bees will collect about it, and thus be kept from joining other stocks and being killed.

This method is always successful, if the queen accompanies the emigrating bees into the upper hive. But this does not invariably happen, and it is hence necessary to ascertain whether she has passed up, before proceeding to locate them permanently. Return the old hive to its former location to receive the bees hovering there, and set that containing the driven swarm on a sheet or on the ground, slightly elevated to admit air. If it contains the queen, the bees will remain quiet; if not, they will speedily begin to desert the hive and rejoin the parent stock, and the operation has been a failure.

We append a few useful suggestions:

1. Driving should not be undertaken till the bees have been "hanging out" several days in succession, rather from want of room than from too much heat. The colony should be a populous one, the hive be full of combs well stored with brood, and mature drones should be seen. Such a stock ought, however, to be taken in hand promptly, for each day's delay involves a loss of honey. Driving is almost indispensable in seasons when honey is abundant, because then the bees gather supplies so eagerly that the queen finds no cells in which to deposit eggs, and the colony grows weak in numbers as it increases in stores.

2. We may occasionally succeed in capturing the queen of a hive filled with brood and honey by giving it a small super or a glass jar containing empty combs, into which she will ascend to supply the cells with eggs. This should be lifted next morning and examined. If the queen is not found, replace the super or jar, and examine it again the ensuing morning; and if still unsuccessful, proceed to drive out a swarm. But if the queen is found in the super, remove the old hive from its stand to a new one; at noon set an empty hive in its place, on which place the super containing the queen, and open the communication between them. A supply of bees will thus be provided for the nucleus, and we are spared the trouble and risks of driving out a swarm.

3. If driven swarms cannot be introduced into hives furnished with combs and honey, they must be carefully fed in bad weather, till they have had time to establish themselves. The honey thus supplied will be liberally repaid by them sooner or later; and feeding is, moreover, now indispensable if we would hope to make store hives of them. Until we attain the full number of such, which we purpose having in the apiary, liberal feeding must be resorted to. He who stints his bees here is sure to be a loser in the end.

5. The hive into which a driven swarm is placed should resemble the parent hive in form and color as much as possible and have its entrance in the same position, or the returning bees will be loth to enter, preferring often to join some other colony.

All other modes of making artificial colonies, whether by inserting brood combs or queen cells, or by introducing unimpregnated queens, are useless and vexatious experiments, when common cottage hives are used in poor honey districts.

Honey is a vegetable secretion which appears at different seasons of the year, especially when flowers in general are in bloom. The bees lick it from the flowers with their long tongue or proboscis, swallow it, and on their return to the hive, disgorge it into the mouth of the cells. Being a vegetable production, its properties depend entirely on the nature of the plants from which it is collected. That gathered from mignonette is of superior fragrance.

It is commonly believed that an apiary is not well situated unless it stands in the sun. This is an error; bees like the shade when working at home, and like the sun only when in the fields, as it then animates and sustains them. They thrive well in dense forests, and delight in them, because they there find a uniform temperature and a propitious shade.

Whether we consider bees in the light of machines, a sort of clock-work, or as having a soul connected with the machine. it is certain they never improve in instinctive sagacity. All their wonderful works, habits, and economy are precisely the same now as they were known to be in the infancy of their history.

Bees should be carefully protected from the heat of the sun in summer, which in some situations is at times so intense as to dissolve the adhesion of the comb, which in its fall crushes the bees, and the hive is ruined.

The Egyptian Bee.

ITS MANAGEMENT IN EGYPT, AND ITS INTRODUCTION INTO GERMANY.

"In conclusion the author enters upon the question of the acclimatization of new forms of bees. For Europe he thinks the most valuable form would be the Egyptian, partly on account of their beauty, and partly because of their unwillingness to use their stings, which appears to be common to all African bees, and is also one of the recommendations of the Italian bee."—*Annals and Magazine of Natural History* for May, 1863.

Some time befere the appearance of Mr. Dallas' epitomised translation of Dr. Gerstäcker's paper on "The Geographical Distribution and Varieties of the Honey Bee," from which the above extract is taken, I had become aware of the value attributed by the learned German to the Egyptian race of honey bees(Apis fasciata,) and had taken steps for obtaining it by sending an order to a distinguished mercantile firm in that country, to whom I had obtained an introduction, for three colonies of bees, accompanying my order with full instructions for packing and transporting them to England. This order was, however, never executed, for reasons which I could not at the time comprehend, but which the following narrative explains clearly enough, and the whole affair remained in abeyance until last year, when I learned that the Berlin Acclimatization Society had taken the matter in hand, with what success Herr Vogel, the distinguished German apiarian who has acted for the society, shall relate for himself.—A DEVONSHIRE BEE-KEEPER.

"We believe that Egypt was included in the range of the creation of the bee, since, on account of the obscurity and insufficient knowledge we possess of the ancient history of this country, we can neither prove that our favorite insect spread by degrees voluntarily into it, nor that it was man who introduced the bee into the valley of the Nile.

"The historical fact that the ancient Egyptians were a cultivated people gives us reason enough to suppose that the bee was domesticated in Egypt in the earliest times. Although we do not find it reckoned among the animals that were considered sacred, yet different antiquaries are of opinion that the mythical sacredness of the bee was likewise intimated in the name of Apis, by which name the sacred bull of the Egyptians was called, as the name of the sacred bull is identical with the later Latin denomination of the bee. It would be overhasty to infer from the biblical account that because the old patriarch Jacob, amongst other presents, also sent honey to "the man" in Egypt, that the bee did not exist in Egypt at that time, and that therefore Jacob wished to make present of honey to Joseph. According to the opinion of biblical commentators the honey (*D'basch,*) mentioned in Gen. liii, 11, was not the honey of bees, but a kind of succedaneum, a thickened grape juice, which was afterwards also taken from Palestine into Egypt, which was poorer in honey. It is still at the present day called Dibs.

"The ancient Egyptians used the Nile to obtain rich harvests, and the ancient Egyptian bee-keepers understood also how to use the river for profiting from the plants through their bees by carrying on an extensive wander-bee-keeping on the great river. As Upper Egypt is hotter than Lower Egypt, and the country there is sooner freed from the inundation, the honey-yielding plants also develope themselves earlier. In Lower and Middle Egypt the bee-hives, having been previously numbered, were piled in a pyramidal form on boats especially constructed for this purpose, and were taken up the Nile with the wandering bee-house.

"When the chief gathering in Upper Egypt was over, they were shipped a few miles lower down the stream, and a halt was again made so long as the bees found plenty of food. In the beginning of February the stocks arrived in Lower Egypt, where they were again delivered to their owners. The bee-keepers of Upper Egypt who had accompanied them, after their hives had profited by the pasture near the sea, went home again with their heavy stocks up the stream, in April.

"The civilization of Egypt fading by degrees, and becoming worn-out and effete, ultimately expired under the rule of the fanatical Mahometans. With the vanishing culture, bee-keeping in Egypt, old and extensive as it was, sunk too; at least modern travellers no longer see anything of wander-bee-keeping on the Nile. A change has taken place in Egypt also in modern times. At present it is only those Arabs (Fellahs) who are settled and carry on agriculture, and a few Copts who keep bees, whilst the Beduins, living on the borders of the desert, keep none at all. From the small number of inhabitants in the country, (about three millions,) we may judge of the very small number of bee-keepers there. Bees are most extensively cultivated in Upper Egypt. They are kept there in movable earthenware vessels, and it is said that these vessels are immediately walled in. In Middle and Lower Egypt there are but few apiaries. An architect named Kindler travelled in the neighborhood of Cairo for some time without discovering one apiary. Besides earthenware vessels, the bee-dwellings here also consist of clay cylinders. Straw hives do not seem to be in use, and when the word *korbe* (straw hives) is used in accounts of travels in Egypt, when speaking of the bee-keeping in that country, it probably means bee-hives only.

"I only know the Egyptian cylinders by sight. They are made of the Nile mud, from which material also the poor people in that country construct their miserable cottages. Such a cylinder is about 15 inches diameter inside, by 3 feet long, and has, therefore, about the same internal dimensions as a large Dzierzon hive. It is 1½ to 2 inches in thickness. The hive is closed at both ends by means of circular dises made of the same material; and the entrance, which is but small, is made in one of these dises. Cross sticks are not employed. The cylinders lie in a horizontal position, and are placed, like draining tiles, under the shade of a tree. The stock which was introduced into

Germany stood in Egypt until its removal under the large tree in the English churchyard at Cairo. The hive of the imported stock was a cylinder, only about one-third of the size of the usual hives, made so small purposely for transportation. February is the swarming season in Upper, and March in Lower Egypt. The imported stock is a small second swarm, which issued in the latter end of March. An artificial increase of stock is not known. Bee-caps are unknown. The Egyptian bee-keepers always approach their bees with their faces unprotected, hive the swarms, and deprive the bees of honey according as they have gathered. The Egyptian clover, Trifolium alexandrinum, is the favorite plant of the bee.

"Of animals hostile to bees which exist in Egypt," continues Herr Vogel, "only hornets and wasps are known to me. At a certain time in summer a boy must always be stationed near the bee-hives, in order to drive away the hornets, or else these animals would rob all the honey from the stocks. He who knows how rich Egypt is in troublesome insects may form an idea what a pest the hornets especially are for the bees and their keepers during the hot season in Egypt. If robbing a stock by wasps has once commenced, it is difficult to afford help. It is, therefore, the chief task of the watchman to ward off the first attacks of these enemies.

"As but a few Fellahs and Copts keep bees, it requires a good deal of time to find out an apiary. A European who does not know the Arabian language can discover an apiary mostly only by chance. Moreover, the Fellahs are so intolerant as often to throw great difficulties in the way of discoveries of this kind in Egypt, which difficulties cannot often be overcome, and travellers are frequently attacked by robbers. In Manzur a Copt keeps bees, who is said to be the Egyptian master of bee-keeping. Herr Hammerschmidt, a photographer, went to this man in 1863 to buy a stock for the Berlin Acclimatization Society; the gloomy, distrustful, and very superstitious Egyptian did not, however, give a decided answer. Not even a dead bee, which was to be sent to Berlin as a sample, could Mr. Hammerschmidt obtain from him. For 15 to 20 thls. (£2 5*s.* to £3) only was he willing to part with a dead bee. Herr Hammerschmidt fortunately succeeded, in 1864, in finding out a small apiary in Old Cairo. The proprietor, a Fellah, who had been brought up in a European family, gave a bee as a sample, and parted with a small swarm for a considerable sum of money. He also made the hive for transportation, and had the box for packing it in made by his son, who was a joiner. This Fellah was only induced to sell the swarm by Mr. Hammerschmidt, who is a perfect master of the Arabian language, remarking to him that his name would not only be mentioned in Europe, but become immortal. This alone had the desired effect. The Fellah would not hive the swarm in a wooden hive, being of opinion the bees were not accustomed to wooden hives, and would die in it. He, however, is not quite an unpractical bee-keeper. In order to compel the bees to make combs parallel to the diameter of the cylinder, he puts old combs on a small forked stick, which is exactly as long as the cylinder is high inside, and fixes them in the hive which is to be stocked. The bees fasten the inserted combs to the surface at the top of the cylinder and to the twig, and after they have been loosened at the top the Fellah can take them out with the stick, and also insert them again. The Fellahs have also partially movable combs. The new combs which the bees make in the cylinder they make parallel to the inserted ones, and the excision of honeycombs is thereby much facilitated.

"The Egyptian bee, which is distinguished from all other known varieties by its small size and light pubescence, is spread over the whole of Egypt. As the valley of the Nile is rather isolated in apiarian respects, this species cannot intermingle with other varieties, and therefore maintains its purity intact. This has been proved by single bees collected from different parts of the country. Arabia, in nature African, has likewise the Egyptian form of honey bee, which is proved by the specimen in the Berlin entomological collection, which was brought by Ehrenberg from Arabia Felix. The Syrian bee differs only from the Egyptian in being somewhat larger, and having a hairy yellow corselet; it is, in other respects, so much like the Egyptian variety that it may be considered as belonging to it. Even at the present day the Syrian form of the Egyptian bee exists in Palestine in hollow trees and clefts of rock, and it was from this bee that honey was obtained by Samson. Besides the Northern and Italian hybridous bees, and the so-called Grecian or Hymettus bee, bees are frequently found in Asia Minor, which by their light-colored corselet-plate and small size again approach the Egyptian bee. The Egyptian form of the species with dark hairy crown of the head, goes through the Himalayas as far as China, and was called by Fabricius Apis cerana.*

"As the subtropical zone is the home of the Egyptian bee, it was feared that this variety, which exists only in hot countries, would soon perish in the climate of Germany. A friend of mine informed me in 1864, that he had heard of the Egyptian bee having been introduced into England years ago, and that it had died there on account of the climate.† I can readily believe that the acclimatization of the Egyptian bee has been attempted in England, and that it soon became extinct there; but, judging from the nature of the Northern and Italian bee, I do not believe that it perished on account of the climate. Any effect of the Egyptian climate upon a being reared in Germany could only be

* The name "Egyptian bee" is, strictly speaking, incorrect, because this bee is also met with in Arabia; but the species being thus styled in works on natural history, having been domesticated and cultivated in Egypt from the earliest times, and finally introduced into Germany from that country, we do not seek to change it. The un-German name, Apis fascíata, (fascio, avi, atum, are, to wind or bind bands around,) was given to it by the French naturalist Latreille (1838,) because he considered it a species of that genius. The Latin name no doubt signifies that this bee appears to be adorned with reddish-yellow and white bands.

†This appears to be a mistake, as I believe no such attempt as that referred to was ever made.—A Devonshire Bee-keeper.

imagined if the so-called cellular or preformation theory were true. According to the imitative or epigenese theory which rests upon the development of all being from the bud or germ, it is quite natural to suppose that the germs of propagation, like the germs of the other organs of the animal body, should be formed and develope themselves in time, so that the influence of the Egyptian climate upon beings developed in Germany cannot be supposed. From the beginning I inferred that if the Egyptian bee could not at once bear our climate, it was doubtful whether it would ever become accustomed to it. If Apis fasciata, in order to be kept with profit, must be compelled to alter its nature, the acclimatization of the insect would become impossible; for the native nature of the bee is, according to our experience, unalterable, whilst its inborn impulses are unchangeable, the Creator not enabling it to develop new instincts. The belief that bees in the West Indies leave off storing honey, because they find food there uninterruptedly during the whole year, is founded in mistake. Such a change in the nature of the insect cannot be imagined, as it is in direct opposition to the immutable laws which govern the nature of the bee. Horses may be broken in, dogs may be trained, nay, even lions, &c., may be tamed, but the nature of the bee neither man nor climate can alter. The latter can only regulate its instinct in every country of the earth in accordance with the variation of the seasons."

[From the American Agriculturist.]

Observations on Burying Bees.

BY BIDWELL BROS., ST. PAUL, MINN.

In a prosperous colony, during a yield of honey, the Queen or mother bee continues laying to supply the place of bees lost from accident or continued labor, causing death. When the yield of honey fails, which often happens in summer, and always in autumn, the Queen ceases laying, and a gradual and certain reduction of numbers and stores takes place. In this way we are confident that more than one-half the relative value of all stocks is lost in the ordinary methods of wintering bees. After a yield of honey, if the weather continues warm, many bees are lost during each successive day, in fruitless attempts to collect honey, requiring also an expenditure of stores for the exertion. From this cause alone, bees at the South are reduced to a mere handful during their mild winters. This can be obviated in a measure by darkening, not closing, the entrance to the hive. Another waste occurs by disturbing the bees in any way, allowing the wind to jar or to cause a draft of air through the hive, making them uneasy; this most frequently happens in windy situations—at times, in all places. The opposite extreme, a want of ventilation, is equally bad, giving the bees much labor to replace with pure air the impure air accumulating in the hive. In moderate weather each rise and fall of the thermometer outside is followed by a similar change of temperature within the hive, the bees expanding their bulk in warm terms of weather, and contracting in cold ones, keeping in a circle to best maintain their heat. Having to do this between several combs, some are left between outside ones, which become chilled and perish. In our climate, where the bees are compelled to remain in their hives several months during the winter, as they have no opportunity to carry out their dead, these accumulate on the bottom.

Placing thermometers in several hives, and outside, we ascertained that when the thermometer outside fell below freezing, and during all the time it remained so, the bees maintained a temperature within, of one degree above freezing, though the water in the open air indicated a temperature as low as 37 degrees below zero, or 68 degrees below that of the bees. Giving three of the stocks a hard rapping, the temperature arose within to 84, 88, and 89 degrees above zero, or an average of 124 degrees above that outside.

In the union of the oxygen of the air with the carbon and hydrogen of the honey eaten, heat, carbonic acid and water are produced, a chemical phenomenon similar to common combustion. Unless the ventilation is very good, the watery vapor is condensed in cold weather to water and ice in the upper part of the hive. The carbonic acid, which is fatal to the bees, if not removed by ventilation, causes death. Hence the need of ventilating the cellars in which bees are kept. In warm terms of weather the ice or frost melts, and running down wets the bees. Should the weather change back to cold immediately, it would cause them to freeze, or closing the entrance with ice, they would smother.

In some of these ways the numbers of the bees are diminished, and they seek to replace the loss by raising brood, which is also attended by many losses. For maturing the young bees, honey, which supports respiration, is consumed, and also pollen, which is necessary to support the growth of the body, and this is attended by a high degree of heat. The honey which is fed to the young bees with the bee bread must contain a large proportion of water, (more than is contained in sealed honey,) and if the bees cannot obtain water to dilute the honey with, the brood will perish. In unfavorable weather it should be given to them in a sponge or similar absorbent, placed within their reach. The proper consistency of honey fed to brood is about that of honey just gathered, which is half water. By observing when bees collect water, one can be sure they are raising brood and consuming honey. If bees remain quiet and are strong in numbers, only honey is needed to carry on respiration. This causes comparatively little waste, but should exertion become necessary, and new bees be required to replenish the hive, pollen is needed, which consists of nutriment and residuum. The latter, if not expelled, accumulates in the bodies of the bees, causing uneasiness and disease.

In burying properly under ground, the principle losses attending bees kept in other ways, are saved by an even temperature, (which we

have found to remain at about 50 degrees,) ample ventilation, complete dryness, and total darkness; these constitute all the essentials to success. After burying, the bees gradually become quiet, usually requiring two days, then an even stillness prevails, which is not interrupted throughout the time they remain, unless heavy jaring occurs on the ground immediately adjoining. The time bees should be buried is when they cease collecting honey, even though it happens in warm weather; then the numbers, which are always large, can be preserved until a yield occurs again. In burying 7 lots of bees last winter, numbering from 1 to 40 colonies, in all 224 stocks, we found burying bees in trenches to require only half the material and labor that placing them in pits, did, as described in the September number, last year. We ascertained it required but one pound per month to winter a strong colony, numbering from 40 to 50 thousand bees. Where the winters are not too severe, as the next best plan to burying, we would advise letting them remain on the summer-stands, removing the honey-board, and placing in its stead a straw mat like that described in the February number of the *Agriculturist* for 1863, page 49; place over it the honey-board and stand-boards, evergreen boughs, or brush with the leaves on around the hives to keep off the warm sun and cold wind, removing occasionally in pleasant weather. This is far better than the usual practice of destroying the bees in autumn, or allowing them to waste away in winter, and might, we think, add millions of dollars annually as profit to bee-keeping.

Stings—Their Prevention and Cure.

Some of our readers may deem us neglectful in having, as it were, left them to struggle through their bee-keeping novitiate without informing them how to avoid being stung by their docile but well-armed flock. Of course, having described the bee-dress, we have supposed that the apiarian was clad, if not "in complete steel," at least in the head-gear and gloves, which will render him invulnerable. The best safeguard from the anger of bees—as, indeed, the malice of men—is a quiet and peaceable spirit. The apiarian will learn to handle his bees not only as "if he loved them,"—as the quaint angler says—but as if he fully believes that the bees love *him*. This they will do whenever he approaches and treats them gently. There are some cases of exception to this generally peaceable disposition of the bee; sometimes a few bees are dispeptic, and refuse to be pacified—let their master seek to bribe them never so wisely. Then, too, sometimes the bee-master himself may be dyspeptic, which the unerring olfactory sense of the bees speedily detects, and their anger is immediately aroused. Some few persons, owing to constitutional peculiarities in their breath or insensible prespiration are objects of constant animosity with bees, who, by driving them from the apiary, are giving a physician's advice without charge for a fee. Some of the choicest perfumes used by ladies are offensive to bees; and one may feel very certain that the "fine puss gentleman" who disgusted the brave Hotspur with his "pouncet box" and praise of "'parmaceti for an inward bruise," would have been speedily driven from an apiary in ignominious flight. Ocassionally, even a skilful apiarian may inadvertently crush a single bee; such a mischance is detected by the community with much more facility than by any "crowner's quest," and their prompt verdict decrees the summary punishment of the offender. There would be much less fear of stings if it were always remembered that bees are never aggressive. "Defence, not defiance," is their motto. They scarcely ever attempt to sting when away from the hive, and very seldom indeed at the time of swarming, for then they are gorged with honey. When molested by angry bees, the safest and best retreat is a green bush. Thrust your head into this, and the bees will soon leave you.

Yet some people appear to think they must inevitably be stung if they meddle with bees; and for their sakes it is needful to explain why it is that a sting is painful, and how the wound inflicted by the bee may be cured. Those familiar with the usual microscopic objects will know how marvellously delicate and yet effective is the mechanical structure of a bee's sting. This weapon, as we see it with our nacked eye—finer than a needle's point—is only the sheath, which lengthens or contracts like the tubes of a telescope. From the sheath is projected the dart, which is double, each half of it piercing alternately deeper into the wound made by the sheath. The dart is barbed on each side, so that the bee, when *very* angry, is scarcely ever able to withdraw it:—

> "Deems life itself to vengeance well resigned;
> Dies on the wound, and leaves the sting behind."

If a patient who receives the sting could only take it patiently, it would not prove half the inconvenience to him that often is the case. There are indeed some happy mortals whose "blood such an even tenor keeps" that a bee-sting is to them simply a puncture, and nothing more. Dr. Bevan has suggested that lovers should subject themselves to the ordeal of a bee-sting in order to prove, we suppose, that their temper is proof against "the *stings* and arrows of any outrageous fortune" that matrimony can bring.

It is the homœopathically minute tincture of poison injected by the bee which causes inflammation. The first thing to do is to remove the sting, which, even when detached from the bee, will continue to penetrate still further into the wound. Next, press the hollow point of a watch-key exactly over the place stung; this will express a considerable portion of the virus. Then dip the hand or bathe the part with cold or tepid water, for the poison is volatile, and will thereby be dissipated to a great extent. On no account whatever should the part affected be rubbed; to do that will diffuse the poison, and increase the inflammation. The specific remedy for a bee sting is taught us by chemistry; the venom is an acid, which an alkali will immediately neutralize when brought into contact with it. Spirits of hartshorn will generally

be found effectual for the purpose, and should always be kept in an apiary. There are also several other remedies, more or less effectual, according to the special constitution of the patient. A strong infusion of tobacco water applied to the wound after the sting has been extracted, is a specific for many persons; others find relief from the application of a sliced onion.

We have heard the remark from several who have kept bees for years, that the poison from a sting has little or no effect on them; after receiving many inflictions their flesh appears to become so little affected that the swelling and pain at one time experienced no longer trouble them.—*Neighbour's Bees and Beeculture.*

Pollen; or, Food for Infant Bees.

Bees, when fully grown, feed almost wholly on honey; but the larvæ require for their development a more substantial kind of nourishment. Such solid fare is found by the bees in the *pollen* of flowers, a farina which contains some of those nitrogenous elements in which honey is deficient. The body of a worker-bee is covered with hairs, to which the pollen adheres when, by contact with the bee, it is rubbed from the anthers and staments of flowers. The bee with its fore-legs then brushes it off, and moulds it into the pellet shape suitable for carrying it in the "baskets" or grooves on its thighs. Dewy mornings or humid bowers suit the bees for the gathering of the pollen. If the atmosphere be too dry for kneading it into pellets, they roll themselves in the blossoms, and trust to the good offices of the bees at home, who, on their return, brush off the farina into the cells intended for it. A portion of this "bee-bread" is taken at once by the "nursing bees," which are supposed to subject it to some change before offering it to the larvæ; but the greater part of the pollen is stored away and sealed over in the cells for future use. In April and May the bees are frequently busy "all the day" in gathering pollen, and often one community of bees will collect about twenty pounds weight of "bee-bread" in one season.

One of the objects of the apiarian is to assist the bees in providing for the nurselings of the hive. A German pastor, Herr Dzierzon, first suggested the plan of providing the bees with "unbolted rye meal" as a substitute for the farina of flowers. He had observed that, in early spring before the flowers were open, his bees returned laden with rye flour. Since his discovery, most bee-keepers, in early spring, place either rye or wheat meal near the apiaries; to this artificial store the bees repair by thousands, and seem to rollick in the enjoyment of so much plenty, many of them returning to the hive as dusty as millers. The object in thus supplying them is that the brood may be rapidly brought forward and early swarming induced. In this way a few pounds of rye meal, at one penny per pound, may tend to the production of very many pounds of honey at twelve times the price.

In gathering pollen from flowers, bees are doing more than merely providing for their own community. Whilst humming through our gardens they are assisting to propogate our flowers, and their merry buzz in our orchards indicates that the blossoms of spring will in autumn fulfil their promise by abundance of fruit. In Mr. Darwin's remarkable work, "The Fertilization of Orchids," the mystery of the fructification of flowers is scientifically explained; but before the subject was so fully understood, it was quite believed that bees in passing from flower to flower performed some important service. Owners of fruit trees have noticed, in a season generally unfavorable for the orchard, that if during only one fine forenoon the bees had spread freely amongst the blossoms of a particular tree, that it would prove more fruitful than its fellows. On this account the orchard is a good place for an apiary, for it seems—more abundant the honey, more plentiful will be the fruit. Bees bear the fructifying matter from one *sex* of flowers to the other, but they confine their attention to one *kind* of flower during each excursion, and the careful observer may see how the color of the pollen on the bodies of the bees will vary from yellow, to red and brown, according to the kind of flowers from which it has been gathered. The gathering of pollen, its use by the nursing bees, and the storing of it in the cells, afford to the bee-keeper opportunity for observations of exceeding interest.—*Neighbour.*

Propolis; or, Bees' Cement.

The old notion that wax is gathered by bees from flowers as they gather honey, has long since been set aside by the discoveries of Hornbostel and Huber. Wax is an oily substance secreted from the honey in the bodies of the bees, on which it forms in thin flakes. But there is "a resinous substance, very tenacious and semi-transparent," which is indispensable for the bees as a cement wherewith to fix their combs and fortify their hives against intruders, and this is "propolis." The bees, in working the propolis, often soften it by blending it with a portion of wax; but they have to extract it in its natural state directly from the bark and buds of certain trees. The bark of the willow, the leaf buds of the poplar and alder, and the unopened blossoms of the hollyhock, are very usual sources of the propolis. In the case of a new swarm, as bees must have this glue before they can begin to build their combs, they will resort to most unlikely places to obtain it. Sometimes they will enter a paint shop and attack the varnish, and it is said they have been seen to obtain propolis from the pitch and rigging of a ship. These circumstances afford intelligible hints to the apiarian, who, if his bees have not easy access to firs, poplars, or willows, will provide some glutinous or resinous matter which may serve for a substitute. The extracting of the propolis costs the bees very considerable labor, which they should be relieved of as much as possible, in order to facilitate their great work of honey gathering. Bees choose the warmer part of the day during which to gather propolis, as then it does not so rapidly

stiffen. Frequently when they arrive at the hive it has become so hard that the other bees are scarcely able to gnaw it from their thighs.

With propolis bees fasten down their hives, stop up crevices to exclude moths and ants, and sometimes use it to narrow the entrance of their hive against the invasion of wasps. Extraordinary anecdotes are told of the prompt and ingenious use they make of this substance. Reaumur relates that a snail having been observed by the bees on the window of the hive, they proceeded to glue the shell to the glass, and there sealed down the intruder in hopeless durance. In another case, that of a slug or snail without a shell, the bees having slain it with their stings, were quite unable to remove it from the hive. With wonderful foresight they then proceeded to secure their community from the noxious effects likely to arise from the decay of the carcass; and this they did by completely enveloping it with a coating of impervious varnish. Huish relates a similar occurrence in the case of a mouse caught in a hive by bees. Propolis yields *benzoic* acid, and contains some aromatic properties.—*Neighbour.*

Pasturage for Bees.

"Bees work for man, and yet they never bruise
Their master's flower, but leave it, having done,
As fair as ever, and as fit for use."

Apiarians generally agree in the opinion that very little can be done in the way of providing any special forage for bees. Yet bee-fanciers are always interested in observing which the flowers are that the bees prefer; and there are certain well-established conclusions as to the kind of district and season which are the likeliest to produce a good honey harvest. There is an old saying that a country which produces the finest wool also yields the best honey; and a pastoral district is decidedly better than one under tillage. The principle of the matter is that the bees are best suited with a long dry season—an early spring, a hot summer, and a late autumn. As not one of these blessings can be commanded by the apiarian, his art must be applied to provide some mitigation of the injury suffered by the bees when the season is short or wet. For early spring, the crocus, the blue hepatica, and the violet, all afford good supplies of honey, and if cultivated near the apiary will be of great service when the wild flowers are backward. All varieties of the willow and poplar furnish early supplies of honey, as well as of the propolis of which we have spoken; the blossoms of the gooseberry and currant are very useful for the bees in May. Wet, when it enters flowers of any kind, prevents the proboscis of the bee from reaching the secret source of honey. On this account it is well to know, as does the bee, that the drooping blossoms of the raspberry escape the effect of the showers, and honey is gathered from them when other flowers are drenched within as well as without. For a similar reason, the borage (*borago officinalis*) is valuable for bees, and, also, because that plant continues to flower until the frosts set in. The honey, both from raspberry blossoms and borage is very superior. Mr. Langstroth says that "the precipitous and rocky lands of New England, which abound with the wild red raspberry, might be made almost as valuable as some of the vine-clad terraces of the mountain districts of Europe." The "golden rod," and also asters, afford superior honey for autumn gathering. Dzierzon strongly recommends buckwheat being sown in the winter stubbles on behalf of the bees, and he tries hard to persuade farmers that it is to their interest to cultivate it. It should be named that all the ordinary fruit blossoms, especially those of the apple, supply abundant stores for bees.

It is, however, to wild or field flowers that the bee-master must chiefly look for the raw material on which his myriad artizans shall exert their skill. The wild clover of the pasture, the wild thyme on the hill, the heather on the moors, the furze and the broom on the sandy waste, offer exhaustless stores for a greater number of bees than can ever be located near them. There are also two or three peculiar sources of honey which one would not have suspected, as, for instance, the blossoms of the onion plant, of turnips, and, in still greater degree, the flower of the mustard plant. In those districts of England where mustard seed is cultivated so extensively, it would be well worth while for the farmers to keep large colonies of bees. Another, but a very uncertain source of honey, is the "honey-dew," which in some seasons appears in large quantities on the leaves of the oak, the lime, and some other trees.

It is important to mention that bees in the principal breeding season require a plentiful supply of water. Owing either to their carelessness or eagerness, they are frequently drowned when drinking from any large quantity of water; the bee-keeper should, therefore, place near the hives shallow vessels of water containing pebbles, on which the bees might alight to take frequent but temperate draughts.

Extra Queens.

In Italianizing my stocks, I have found the old queen and a young laying queen at the same time, in five hives. They had not swarmed for three years. One old queen was in a cluster on the bottom, being worried to death. One of the five was renewed at the swarming season; and there were three cases of a renewal of young or this year's queens. There seems to have been a perfect mania among the bees to get rid of their old queens, as some of them have done so since killing their drones. J. M. M.

St. Charles, Ill.

Difficult as the science of bee-keeping may seem, it is not beyond the reach of attentive perseverance; and the very difficulties, as in most cases, only serve to enhance the pleasure and gratification of the bee-keeper.

Every village and town can support a hundred fold more bees than now have existence among us.

THE AMERICAN BEE JOURNAL.

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The Egyptian Bee.

We copy in this number, from the London "*Journal of Horticulture*," a portion of Mr. Woodbury's translation of an article relative to the introduction, into Germany, of the Egyptian bee. This variety of the honey bee, hitherto known in Europe only to scientific entomologists, now engages the attention of practical apiarians there, and will doubtless be brought to this country ere long. We have received a copy of Mr. Vogel's treatise on the subject, which, with the remaining portion of Mr. Woodbury's translation, and several articles in the *Bienenzeitung*, will enable us to place before our readers a full account of what, we trust, may prove to be a valuable acquisition.

☞ WE heard recently of a bee-keeper who "killed off" his common bees by *brimstoning* them, and sold the honey, with the intention of introducing the Italian bee in his apiary next spring. Should all his neighbors who keep bees "go and do likewise," he will probably not be much annoyed with *hybrids* next summer, provided he makes a fair start with pure stock. But had he been a subscriber to the BEE JOURNAL, he might have discovered that there is "a more excellent way." Experience is a dear school; yet some folks will take lessons in no other!

Bee Superstition.

A correspondent of the New Zealand papers gives the following story as being told by a Buckinghamshire bee-keeper. He relates as follows:

"*Superstition indulged in with regard to Bees.*—These are many and curious. I remember when I lived in Buckinghamshire and kept bees there, noting some strange beliefs respecting them. One evening I was stopping at the house of a farmer whose mother had died that morning. His wife went out in the evening, and tapped at every hive, repeating before each: 'Bees, bees, your mistress is dead!' and she gravely assured me that if she had not done so, the bees would inevitably have forsaken the spot. One day a difficulty occurred between myself and my gardener in respect to the bees. He wanted to have his way in reference to some arrangements for them, and I had rather a desire to have mine, and we had a little difference on the subject, which I cut short by ordering my wishes to be promptly attended to, whereupon the fellow went half-unwilling, half-sulkily away, saying: 'The bees will all die; they'll all die, because there's been words about them.' Now, as I did not wish his words to come true, I took the liberty of smoking my last weed at night up and down the garden-walk by which the bees stood, and by a curious coincidence the gardener came prowling round there, and was rather surprised at finding me out at that time. The same thing happened the next night, and finding that I did not mean to permit an epidemic amongst my bees if I could prevent it, he did not come again, and my bees did not die after all. If I had not suspected that the rascal would strive to serve me out, no doubt my bees would have perished, and I should have been requested to believe that it was in consequence of there having been words about them, which, after all, would no doubt, in one sense, have been perfectly true."
—*Journal of Horticulture, (London.)*

[Correspondence of the Bee Journal.]

THERE is considerable interest felt in bee-culture in this region. There were in the summer of 1863 about four thousand colonies in this (Harrison) county. That season was so extremely unfavorable for honey-gathering that the number was reduced by starvation to about one thousand before the next spring, notwithstanding nearly four thousand dollars worth of Cuba honey was purchased and fed. Success to the BEE JOURNAL. R. W.
CADIZ, OHIO.

I AM pleased with the appearance of the BEE JOURNAL thus far, and hope it will prosper abundantly. In New England we have had the hardest season for bees that has been known for many years, and some of the older bee-keepers who manage bees on antiquated principles are discouraged. But the enterprising and scientific apiarian is not disheartened by a single unfavorable season. J. L. H.
WALPOLE, N. H.

BEES did not do much here this summer in swarming or gathering honey, on account of the wet season. M. W.
VENANGO CO., PA.

BEES have done poorly here. Few swarms and little honey. I have twenty-five Italian stocks. J. T. M.
GEANGA CO., OHIO.

I HAVE received the July and August numbers of your excellent paper. There are but few bees in this country yet; but it is about to be revolutionized and made of some note in bee-culture. A. K.
FORT DODGE, IOWA.

Care of the Young.

The common hive-bee and the wasp in their attention to their young exhibit the same general features. Both build for their reception hexagonal cells, differing in size according to the future sex of the included grubs, which as soon as hatched they both feed and assiduously tend until their transformation into pupæ. There are peculiarities, however, in their modes of procedure, which require a distinct notice.

The economy of a nest of wasps differs from the *bees*, in that the eggs are laid not by a single mother or queen, but by several; and that these mothers take the same care as the workers in feeding the young grubs; indeed, those first hatched are fed entirely by the female which produced them, the solitary founder of the colony. The sole survivor probably of a last year's swarm of many thousands—this female, as soon as revived by the warmth of spring, proceeds to construct a few cells, and deposits in them the eggs of working wasps. The eggs are covered with a gluten, which fixes them so strongly against the sides of the cells that it is not easy to separate them unbroken. These eggs seem to require care from the time they are laid, for the wasps many times in a day put their heads into the cells which contain them. When they are hatched, it is amusing to witness the activity with which the female runs from cell to cell, putting her head into those in which the grubs are very young, while those that are more advanced in age thrust their heads out of their cells, and by little movements seem to be asking for their food. As soon as they receive their portion they draw them back and remain quiet. These she feeds until they become pupæ; and within twelve hours after being excluded in their perfect state, they eagerly set to work in constructing fresh cells, and in lightening the burden of their parent by assisting her in feeding the grubs of other workers and females which are by this time born. In a few weeks the society will have received an accession of several hundred workers and many females, which, without distinction, apply themselves to provide food for the growing grubs, now become exceedingly numerous. With this object in view, as they collect little or no honey from flowers, they are constantly engaged in predatory expeditions. One party will attack a hive of bees, a grocer's sugar hogshead, or other saccharine repository; or, if these fail, the juice of a ripe peach or pear. You will be less indignant than formerly at these audacious robbers now you know that self is little considered in their attacks, and that your ravaged fruit has supplied an exquisite banquet to the most tender grubs of the nest, into whose extended mouths the successful marauders, running with astonishing agility from one cell to another, disgorge successively a small portion of their booty in the same way that a bird supplies her young. Another party is charged with providing more substantial aliment for the grubs of maturer growth. These wage war upon bees, flies, and even the meat of a butcher's stall, and joyfully return to the nest laden with the well-filled bodies of the former, or pieces of the latter, as large as they can carry. This solid food they distribute in like manner to the larger grubs, which may be seen eagerly protruding their heads out of the cells to receive the welcome meal. As wasps lay up no store of food, these exertions are the task of every day during the summer, fresh broods of grubs constantly succeeding to those which have become pupæ or perfect insects; and in autumn, when the colony is augmented to 20,000 or 30,000, and the grubs in proportion, the scene of bustle which it presents may be readily conceived.

Though such is the love of wasps for their young, that if their nest be broken almost entirely in pieces, they will not abandon it, yet when the cold weather approaches, a melancholy change ensues, followed by a cruel catastrophe, which at first you will be apt to regard as ill comporting with this affectionate character. As soon as the first sharp frost of October has been felt, the exterior of a wasp's nest becomes a perfect scene of horror. The old wasps drag out of the cells all the grubs, and unrelentingly destroy them, strewing their dead carcasses around the door of their now desolate habitation. "What monsters of cruelty!" I hear you exclaim, "what detestable barbarians!" But be not too hasty. When you have coolly considered the circumstances of the case, you will view this seemingly cruel sacrifice in a different light. The old wasps have no stock of provisions; the benumbing hand of Winter is about to incapacitate them from exertion, while the season itself affords no supply. What resource then is left? Their young must linger on a short period, suffering all the agonies of hunger, and at length expire. They have it in their power at least to shorten the term of this misery—to cut off its bitterest moments. A sudden death by their own hands is comparatively a merciful stroke. This is the only alternative; and thus, in fact, this apparent ferocity is the last effort of tender affection, active even to the end of life. I do not mean to say that this train of reasoning actually passes through the mind of the wasps. It is more correct to regard it as having actuated the benevolent author of the instinct so singularly, and without doubt so wisely, excited. Were a nest of wasps to survive the winter, they would increase so rapidly that not only would all the bees, flies, and other animals on which they prey be extirpated, but man himself find them a grievous pest. It is necessary, therefore, that the great mass should annually perish; but that they may suffer as little as possible, the Creator, mindful of the happiness of the smallest of his creatures, has endowed a part of the society, at the destined time, with the wonderful instinct which, previously to their own death, makes them the executioners of the rest.

Wasps in the construction of their nests have solely in view the accomodation of their young ones, and to these their cells are exclusively devoted. *Bees*, on the contrary, (I am speaking of the common hive-bee,) appropriate a considerable number of their cells to the reception of honey intended for the use of the society.

Yet the education of the young brood is their chief object, and to this they constantly sacrifice all personal and selfish considerations. In a new swarm the first care is to build a series of cells to serve as cradles; and little or no honey is collected until an ample store of *bee-bread*, as it is called, has been laid up for their food. This bee-bread is composed of the pollen of flowers, which the workers are incessantly employed in gathering, flying from flower to flower, brushing from the stamens their yellow treasure, and collecting it in the little baskets with which their hind legs are so admirably provided; then hastening to the hive, and having deposited their booty, returning for a new load. The provision thus furnished by one set of laborers is carefully stored up by another, until the eggs which the queen-bee has laid, and which, adhering by a glutinous covering, she places nearly upright in the bottom of the cell, are hatched. With this bee-bread, after it has undergone a conversion into a sort of whitish jelly by being received into the bee's stomach, where it is probably mixed with honey and regurgitated, the young brood immediately upon their exclusion, and until their change into nymphs are diligently fed by other bees, which anxiously attend upon them and several times a day afford a fresh supply. Different bees are seen successively to introduce their heads into the cells containing them, and after remaining in that position some moments, during which they replace the expended provision, pass on to those in the neighborhood. Others often immediately succeed, and in like manner put in their heads as if to see that the young ones have every thing necessary; which being ascertained by a glance, they immediately proceed, and stop only when they find a cell almost exhausted of food. That the office of these purveyors is no very simple affair will be admitted when it is understood that the food of all the grubs is not the same, but that it varies according to their age, being insipid when they are young, and, when they have nearly attained maturity, more sugary and somewhat acid. The larvæ destined for queen-bees, too, require a food altogether different from that appropriated to those of drones and workers. It may be recognized by its sharp and pungent taste.

So accurately is the supply of food proportioned to the wants of the larvæ, that when they have attained their full growth and are ready to become nymphs, not an atom is left unconsumed. At this period, intuitively known to their assiduous foster-parents, they terminate their cares by sealing up each cell with a lid of wax, convex in those containing the larvæ of drones, and nearly flat in those containing the larvæ of workers, beneath which the enclosed tenants spin in security their cocoon. In all these labors neither the queen nor the drones take the slightest share. They fall exclusively upon the workers, who, constantly called upon to tend fresh broods as those brought to maturity are disposed of, devote nearly the whole of their existence to these maternal offices.

Humble-bees, which in respect of their general policy, must, when compared with bees and wasps, be regarded as rude and untutored villagers, exhibit, nevertheless, marks of affection for their young quite as strong as their more polished neighbors. The females, like those of wasps, take a considerable share in their education. When one of them has with great labor constructed a commodious waxen cell, she next furnishes it with a store of pollen moistened with honey; and then, having deposited six or seven eggs, carefully closes the orifice and minutest interstices with wax. But this is not the whole of her task. By a strange instinct, which, however, may be necessary to keep the population within due bounds, the workers, while she is occupied in laying her eggs, endeavor to seize them from her, and, if they succeed, greedily devour them. To prevent this violence, her utmost activity is scarcely adequate; and it is only after she has again and again beat off the murderous intruders, and pursued them to the furthest verge of the nest, that she succeeds in her operation. When finished, she is still under the necessity of closely guarding the cell, which the gluttonous workers would otherwise tear open, and devour the eggs. This duty she performs for six or eight hours with the vigilance of an Argus, at the end of which time they lose their taste for this food, and will not touch it even when presented to them. Here the labors of the mother cease, and are succeeded by those of the workers. These know the precise hour when the grubs have consumed their stock of food, and from that time to their maturity regularly feed them with either honey or pollen, introduced in their proboscis through a small hole in the cover of the cell opened for the occasion, and then carefully closed.

They are equally assiduous in another operation. As the grubs increase in size, the cell which contained them becomes too small, and in their exertions to be more at ease they split its thin sides. To fill up these breaches as fast as they occur with a patch of wax is the office of the workers, who are constantly on the watch to discover when their services are wanted; and thus the cells daily increase in size, in a way which to an observer ignorant of the process seems very extraordinary.

The last duty of these affectionate foster-parents is to assist the young bees in cutting open the cocoons which have enclosed them in the state of *pupæ*. A previous labor, however, must not be omitted. The workers adopt similar measures with the hive-bee for maintaining the young pupæ concealed in these cocoons in a genial temperature. In cold weather and at night they get upon them and impart the necessary warmth by brooding over them in clusters. Connected with this part of their domestic economy, M. P. Huber, a worthy scion of a celebrated stock, and an inheritor of the science and merits of the great Huber as well as of his name, in his excellent paper on these insects in the sixth volume of the Linnean Transactions, from which most of these facts are drawn, relates a singularly curious anecdote.

In the course of his ingenious and numerous experiments, M. Huber put under a bell-glass about a dozen humble-bees without any store

of wax, along with a comb of about ten silken cocoons so unequal in height that it was impossible the mass should stand firmly. Its unsteadiness disquieted the humble-bees extremely. Their affection for their young led them to mount upon the cocoons for the sake of imparting warmth to the enclosed little ones; but in attempting this the comb tottered so violently that the scheme was almost impracticable. To remedy this inconvenience, and to make the comb steady, they had recourse to a most ingenious expedient. Two or three bees got upon the comb, stretched themselves over its edge, and with their heads downwards fixed their fore feet on the table upon which it stood, whilst with their hind feet they kept it from falling. In this constrained and painful posture, fresh bees relieving their comrades when weary, did these affectionate little insects supported the comb for nearly three days. At the end of this period they had prepared a sufficiency of wax with which they built pillars that kept it in a firm position, but by some accident afterwards these got displaced, when they had again recourse to their former manœuvre for supplying their place; and this operation they perseveringly continued until M. Huber, pitying their hard case, relieved them by fixing the object of their attention firmly on the table.

It is impossible not to be struck with the reflection that this most singular fact is inexplicable on the supposition that insects are impelled to their operations by a blind instinct alone. How could mere machines have thus provided for a case which in a state of nature has probably never occurred to ten nests of humble-bees since the creation? If in this instance the little animals were not guided by a process of reasoning, what is the distinction between reason and instinct? How could the most profound architect have better adapted the means to the end; how more dexterously *shored* up a tottering edifice, until his beams and his props were in readiness?—*Kirby.*

Bees.

Mr. Tegetmeier recently maintained before the London Entomological Society that bees have no instinct in shaping their cells, as has been usually supposed, but the form is the consequence of the law or property of space; that of seven circles of equal radii, six will just surround the seventh. The cell of the bee is invariably hemispherical at its commencement, and the section of a cell not in contact with another always circular.

The odor exhaled from the hives, and the size of the bees on their return from foraging excursions, are always sure indications whether the flowers contain honey.

Great progress is being made in bee-culture in this country, as it has been concluded to be a very profitable undertaking. We expect the introduction of Egyptian bees in this country shortly.

Habitations of Insects.

The solitary insects which construct habitations for their future young without any view to their own accommodation, chiefly belong to the order *Hymenoptera*, and are principally different species of wild bees and wasps. Of these the most simple are built by *Colletes succincta*, *fodiens*, &c. The situation which the parent bee chooses is either the dry earth of a bank, or the vacuities of stone walls cemented with earth instead of mortar. Having excavated a cylinder about two inches in depth, running usually in a horizontal direction, the bee occupies it with three or four cells about half an inch long, and one sixth broad, shaped like a thimble, the end of one fitting into the mouth of another. The substance of which these cells are formed is two or three layers of a silky membrane, composed of a kind of glue secreted by the animal, resembling gold-beater's leaf, but much finer, and so thin and transparent that the color of an included object may be seen through them. As soon as one cell is completed, the bee deposits an egg within, and nearly fills it with a paste composed of pollen and honey, which having done, she proceeds to form another cell, storing it in like manner until the whole is finished, when she carefully stops up the mouth of the orifice with earth. Our countryman Grew seems to have found a series of these nests in a singular situation—the middle of the pith of an old elder branch—in which they were placed lengthwise one after another, with a thin boundary between each.

Cells composed of a similar membranaceous substance, but placed in a different situation, are constructed by *Anthidium manicatum*. This gay insect does not excavate holes for their reception, but places them in the cavities of old trees, or of any other object that suits its purpose. Sir Thomas Cullum discovered the nest of one in the inside of the lock of a garden-gate, in which I have also since twice found them. It should seem, however, that such situations would be too cold for the grubs without a coating of some non-conducting substance. The parent bee, therefore, after having constructed the cells, laid an egg in each, and filled them with a store of suitable food, plasters them with a covering of vermiform masses, apparently composed of honey and pollen; and having done this, aware, long before Count Rumford's experiments, what materials conduct heat most slowly, she attacks the woolly leaves of *Stachys lanata*, *Agrostemma coronaria*, and similar plants, and with her mandibles industriously scrapes off the wool, which with her fore-legs she rolls into a little ball and carries to her nest. This wool she sticks upon the plaster that covers her cells, and thus closely envelops them with a warm coating of down, impervious to every change of temperature.

The bee last described may be said to exercise the trade of a *clothier*. Another numerous family would be more properly compared to *carpenters*, boring with incredible labor out of the solid wood long cylindrical tubes, and dividing them into various cells. Amongst these, one of the most remarkable is *Xylocopa*

violacea, a large species, a native of Middle and Southern Europe, distinguished by beautiful wings of a deep violet color, and found commonly in gardens, in the upright putrescent espaliers or vine props of which, and occasionally in the garden seats, doors, and window-shutters, she makes her nest. In the beginning of spring, after repeated and careful surveys, she fixes upon a piece of wood suitable for her purpose, and with her strong mandibles begins the process of boring. First proceeding obliquely downwards, she soon points her course in a direction parallel with the sides of the wood, and at length with unwearied exertion forms a cylindrical hole or tunnel not less than twelve or fifteen inches long, and half an inch broad. Sometimes, where the diameter will admit of it, three or four of these pipes, nearly parallel with each other, are bored in the same piece. Herculean as this task, which is the labor of several days, appears, it is but a small part of what our industrious bee cheerfully undertakes. As yet she has completed but the shell of the destined habitation of her offspring, each of which, to the number of ten or twelve, will require a separate and distinct apartment. How, you will ask, is she to form these? With what materials can she construct the floors and ceilings? Why truly God "doth instruct her to discretion and doth teach her." In excavating her tunnel she has detached a large quantity of fibres, which lie on the ground like a heap of saw-dust. This material supplies all her wants. Having deposited an egg at the bottom of the cylinder along with the requisite store of pollen and honey, she next, at the height of about three quarters of an inch, (which is the depth of each cell,) constructs of particles of the saw-dust glued together and also to the sides of the tunnel, what may be called an annular stage or scaffolding. When this is sufficiently hardened, its interior edge affords support for a second ring of the same materials, and thus the ceiling is gradually formed of these concentric circles till there remains only a small orifice in its centre, which is also closed with a circular mass of agglutinated saw-dust. When this partition, which serves as the ceiling of the first cell and the flooring of the second, is finished, it is about the thickness of a crown-piece, and exhibits the appearance of as many concentric circles as the animal has made pauses in her labor. One cell being finished, she proceeds to another, which she furnishes and completes in the same manner, and so on, until she has divided her whole tunnel into ten or twelve apartments.

Here, if you have followed me in this detail with the interest which I wish it to inspire, a query will suggest itself. It will strike you that such a laborious undertaking as the constructing and furnishing these cells cannot be the work of one or even of two days. Considering that every cell requires a store of honey and pollen, not to be collected but with long toil, and that a considerable interval must be spent in agglutinating the floors of each, it will be very obvious to you that the last egg in the last cell must be laid many days after the first. We are certain, therefore, that the first egg will become a grub, and, consequently, a perfect bee many days before the last. What then becomes of it? you will ask. It is impossible that it should make its escape through eleven superincumbent cells without destroying the immature tenants; and it seems equally impossible that it should remain patiently in confinement below them until they are all disclosed. This dilemma our heaven-taught architect has provided against. With forethought never enough to be admired she has not constructed her tunnel with one opening only, but at the further end has pierced *another* orifice, a kind of back door, through which the insects produced by the first-laid eggs successively emerge into day. In fact, all the young bees, even the uppermost, go out by this road; for, by an exquisite instinct, each grub, when about to become a pupæ, places itself in its cell with its head downwards, and thus is necessitated, when arrived at its last state, to pierce its cell in this direction.

Ceratina albilabris of Spinola, who has given an interesting account of its manners, forms its cell upon the general plan of the bee just described, but, more economical of labor, chooses a branch of briar or bramble, in the pith of which she excavates a canal about a foot long, and one line, or sometimes more, in diameter, with from eight to twelve cells separated from each other by partitions of particles of pith glued together; and from the dead sticks of the same plants in which they had formed their cells in a similar way, M. M. Dufour and Perris have bred in the sandy district of the *Landes*, in the south-west of France, not fewer than twelve distinct species of wild bees.

Such are the curious habitations of the carpenter bees and their analogues. Next I shall introduce you to the not less interesting structures of another group of bees, which carry on the trade of *masons*, (*Megachile muraria*,) building their solid houses solely of artificial stone. The first step of the mother bee is to fix upon a proper situation for the future mansion of her offspring. For this she usually selects an angle, sheltered by any projection, on the south side of a stone wall. Her next care is to provide materials for the structure. The chief of these is sand, which she carefully selects grain by grain from such as contains some mixture of earth. These grains she glues together with her viscid saliva into masses the size of small shot, and transports by means of her jaws to the site of her castle. With a number of these masses, which are the artificial stone of which her building is to be composed, united by a cement preferable to ours, she first forms the basis or foundation of the whole. Next she raises the walls of a cell, which is about an inch in length, and half an inch broad, and, before its orifice is closed, in form resembles a thimble. This, after depositing an egg and a supply of honey and pollen, she covers in, and then proceeds to the erection of a second, which she finishes in the same manner, until the whole number, which varies from four to eight, is completed. The vacuities between the cells, which are not placed in any regular

order, some being parallel to the wall, others perpendicular to it, and others inclined to it at different angles, this laborious architect fills up with the same material of which the cells are composed, and then bestows upon the whole group a common covering of coarser grains of sand. The form of the whole nest, which when finished is a solid mass of stone so hard as not to be easily penetrated with the blade of a knife, is an irregular oblong of the same color as the sand, and to a casual observer more resembling a splash of mud than an artificial structure. These bees sometimes are more economical of their labor, and repair old nests, for the possession of which they have very desperate combats. One would have supposed that the inhabitants of a castle so fortified might defy the attacks of every insect marauder. Yet an Ichneumon and a beetle (*Clerus apiarius*) both contrive to introduce their eggs into the cells, and the larvæ proceeding from them devour their inhabitants.

Other bees of the same group with that last described use different materials in the construction of their nests. Some employ fine earth made into a kind of mortar with gluten. Another, (*Osmia cœrulescens*,) as we learn from De Geer, forms its nest of argillaceous earth mixed with chalk, upon stone walls, and sometimes probably nidificates in chalk-pits. *O. bicornis*, according to Reaumur, selects the hollows of large stones for the site of its dwelling; but in England seems to prefer rotten posts and palings, in which it bores upwards, and then forms the partitions of its cells of clay and sand glued together. One species of this genus (*O. gallarum*) saves itself trouble by placing its cells in an abandoned gall of the oak, and others select, with the like object, empty snail-shells. One remarkable peculiarity of some of these insects is that they conceal the place where their cells are situated with some extraneous material. Thus *O. gallarum* hides the galls it has adopted by glueing round them oak leaves, and a species which M. Goureau conceives to be *O. bicolor* employed a whole day in arranging over the mouth (as he supposes) of its cell pieces of grass about two inches long, in a conical or tent-like form; and that this species employs this material for some purpose connected with its nest is confirmed by Mr. Thwaites, who observed a female for a considerable time fetching similar pieces of grass, and laying them over a snail-shell, where he had every reason to believe she had formed her cells. Unfortunately neither M. Goureau nor Mr. Thwaites could pursue their observations, not having been able the following day to find any trace of the labors they had observed on that preceding.

The works thus far described require in general less genius than labor and patience, but it is far otherwise with the nests of the last tribe of artificers amongst wild bees, to which I shall advert—the hangers of tapestry or *upholsterers*—those which line the holes excavated in the earth for the reception of their young with an elegant coating of flowers or of leaves. Amongst the most interesting of these is *Megachile Papaveris*, a species whose manners have been admirably described by Reaumur. This little bee, as though fascinated with the color most attractive to our eyes, invariably chooses for the hangings of her apartments the most brilliant scarlet, selecting for its material the petals of the wild poppy, which she dexterously cuts into the proper form. Her first process is to excavate in some pathway a burrow, cylindrical at the entrance, but swelled out below to the depth of about three inches. Having polished the walls of this little apartment, she next flies to a neighboring field, cuts out oval portions of the flowers of poppies, seizes them between her legs, and returns with them to her cell; and though separated from the wrinkled petal of a half-expanded flower, she knows how to straighten their folds, and, if too large, to fit them to her purpose by cutting off the superfluous parts. Beginning at the bottom, she overlays the walls of her mansion with this brilliant tapestry, extending it also on the surface of the ground round the margin of the orifice. The bottom is rendered warm by three or four coats, and the sides have never less than two. The little upholsterer, having completed the hangings of her apartment, next fills it with pollen and honey to the height of about half an inch; then, after committing an egg to it, she wraps over the poppy lining so that even the roof may be of this material, and lastly closes its mouth with a small hillock of earth. The great depth of the cell compared with the space which the single egg and the accompanying food deposited in it occupy deserves particular notice. This is not more than half an inch at the bottom, the remaining two inches and a half being subsequently filled with earth. When you next favor me with a visit, I can show you the cells of this interesting insect as yet unknown to British entomologists, for which I am indebted to the kindness of M. Latreille, who first scientifically described the species.

Megachile centuncularis, *M. Willughbiella*, and other species of the same family, like the preceding, cover the walls of their cells with a coating of leaves, but are content with a more sober color, generally selecting for their hangings the leaves of trees, especially of the rose, whence they have been known by the name of the *leaf-cutter* bees. They differ also from *M. Papaveris* in excavating longer burrows, and filling them with several thimble-shaped cells composed of portions of leaves so curiously convoluted, that, if we were ignorant in what school they have been taught to construct them, we should never credit their being the work of an insect. Their entertaining history, so long ago as 1670, attracted the attention of our countrymen Ray, Lister, Willughby, and Sir Edward King; but we are indebted for the most complete account of their procedures to Reaumur.

The mother-bee first excavates a cylindrical hole eight or ten inches long, in a horizontal direction, either in the ground or in the trunk of a rotten willow-tree, or occasionally in other decaying wood. This cavity she fills with six or seven cells wholly composed of portions of leaf, of the shape of a thimble, the convex end of one closely fitting into the open end of

another. Her first process is to form the exterior coating, which is composed of three or four pieces of larger dimensions than the rest, and of an oval form. The second coating is formed of portions of equal size, narrow at one end, but gradually widening towards the other, where the width equals half the length. One side of these pieces is the serrate margin of the leaf from which it was taken, which, as the pieces are made to lap one over the other, is kept on the outside, and that which has been cut within. The little animal now forms a third coating of similar materials, the middle of which, as the most skilful workman would do in similar circumstances, she places over the margins of those that form the first tube, thus covering and strengthening the junctures. Repeating the same process, she gives a fourth and sometimes a fifth coating to her nest, taking care, at the closed end or narrow extremity of the cell, to bend the leaves so as to form a convex termination. Having thus finished a cell, her next business is to fill it to within half a line of the orifice with a rose-colored conserve composed of honey and pollen, usually collected from the flowers of thistles; and then having deposited her egg, she closes the orifice with three pieces of leaf so exactly circular, that a pair of compasses could not define their margin with more truth; and coinciding so precisely with the walls of the cell, as to be retained in their situation merely by the nicety of their adaptation. After this covering is fitted in, there remains still a concavity which receives the convex end of the succeeding cell; and in this manner the indefatigable little animal proceeds until she has completed the six or seven cells which compose her cylinder.

The process which one of these bees employs in cutting the pieces of the leaf that compose her nest is worthy of attention. Nothing can be more expeditious; she is no longer about it than we should be with a pair of scissors. After hovering for some moments over a rose-bush, as if to reconnoitre the ground, the bee alights upon the leaf which she has selected, usually taking her station upon its edge, so that the margin passes between her legs. With her strong mandibles she cuts without intermission in a curve line so as to detach a triangular portion. When this hangs by the last fibre, lest its weight should carry her to the ground, she balances her little wings for flight, and the very moment it parts from the leaf flies off with it in triumph; the detached portion remaining bent between her legs in a direction perpendicular to her body. Thus without rule or compasses do these diminutive creatures mete out the materials of their work into portions of an ellipse, into ovals or circles, accurately accommodating the dimensions of the several pieces of each figure to each other. What other architect could carry impressed upon the tablet of his memory the entire idea of the edifice which he has to erect, and destitute of square or plumb-line, cut out his materials in their exact dimensions without making a single mistake? Yet this is what our little bee invariably does. So far are human art and reason excelled by the teaching of the Almighty.

How May Store Stocks be Formed?

1. By placing populous colonies in hives proportionally large, affording ample space for the accommodation of brood and the storage of honey. Populous colonies can be secured by supplying the swarms with empty combs or comb foundations.

2. By uniting weak colonies with stronger ones in the fall, giving to the united stock all the stores which the two hives contain, and reserving all the pure empty combs for the use of the late swarms in the ensuing spring.

3. By wintering exclusively one or two year old fertile and vigorous queens; substituting healthy fertile queens for young and feeble ones, and such as are poor layers; at the same time keeping constantly on hand a supply of fertile surplus queens in nucleid, for the prompt cure of occurring queenlessness.

4. By restraining the consumption of stores during winter as much as possible; withdrawing the hives from the influence of varying temperature; sheltering them from cold winds, rain, and snow; or where practicable, placing them in a cool, dry, dark chamber or cellar.

5. By encouraging the production of brood in the spring; using diluted honey every other evening as a stimulative food, and administering it in liberal doses of from three to four pounds in the course of every three days.

6. By thorough examination of all the colonies at the beginning of full pasturage, and equalizing them in numbers and quality as nearly as may be practicable. Combs containing honey and brood are to be taken from the stronger colonies and given to the weaker. The bees of queenless colonies should be given to neighboring stocks not so bereaved. Drone combs should be removed, and clean worker combs substituted.

7. At the opening of full pasturage, supers and surplus honey boxes must be made accessible to the bees, though not to the queens. Drone combs, removed from the main-hive or brooding chamber, may be very advantageously inserted in the surplus honey box.

8. While engaged in multiplying stocks for the enlargement of our apiaries, we must not expect to obtain large harvests of honey. The main effort must therefore be to attain the normal number of stocks intended to be kept, as early as practicable, without falling into the pernicious error of multiplying more rapidly than the season and the amount of pasturage available will justify.

9. By preventing the bees from hanging out idly at any time, and by checking brooding and comb-buildiug at improper periods. The queens should always be removed, at least temporarily, at the close of the term of full pasturage.

10. By improving the pasturage of the vicinage by encouraging the cultivation of honey-yielding crops, and the planting of locust, linden, and other advantageous shade trees.

DR. VOIGT.

We have, on page 87, a very interesting article about Egyptian bees.

Bees and Blossoms.

It is a striking fact that in many districts flowers will be much frequented by bees, which, in others, are entirely neglected by them; nay, that in the same locality those which are commonly disregarded, will occasionally be visited by crowds of these busy insects. To account for this seeming capriciousness may be thought by some to be an easy task. Thus it may be alleged that the neglected blossoms yield no honey in that particular district or season, or that other plants there found, and then in blossom, yield nectar so superabundantly that the bees prefer working on them. In many, perhaps in most cases, this may not only be a satisfactory, but the true solution of the question. Yet it is not always correct. Thus, for example, during my residence in Russia, the bees of my apiary in Podolsk, during more than ten years, totally neglected the blossoms of the wild jasmine (Philadelphus coronarius Linn) growing there in every garden, and rich in nectar. But in 1862 I was greatly surprised to find them visiting these blossoms in crowds, and gathering honey. So likewise with the poppy, which is extensively cultivated there every year. During a series of years its blossoms were unfrequented by the bees. Suddenly, however, I observed that a change had occurred, and the poppy was now become a favorite with them, and visited by such multitudes that I could always find several individuals busy in every flower, collecting pollen with a will. Now what was the cause of this singular conduct? It cannot be ascribed to the absence of honey in the blossoms of the jasmine, nor to the deficiency of pollen in those of the poppy, in the years when they were respectively neglected, for, as I remarked, there was then an abundance of honey in the nectaries of the jasmine blossoms, and plenty of pollen on the anthers of the poppy. Was there a peculiar scarcity, at the time, of other honey and pollen producing flowers? By no means. The trees, shrubs, and plants of the district were then in blossom as usual, and as rich in nectar and pollen, as in the years when jasmine and poppy had no attractions for the bee.

How then is this strange contrariety to be accounted for? I must confess it is a mystery which I am unable to fathom. To be able to explain it, or in general to attain to any correct results as regards the bee-flora of a country or district, it is requisite that we should obtain reports of observations made in every section of it, enumerating the plants resorted to or disregarded by the bees, in ordinary times as well as in special instances. But these observations must be very carefully made to preclude error, which, once admitted, is so difficult to be eliminated. And especially must we be heedful not to confound the various species of wild bees (Melittæ, &c.) with our common honey-bee—a mistake which Gleditsch so frequently made, that to me the larger portion of his observations are, in this respect, utterly valueless, or at best apocryphal. So, also, should the proper name of the tree or plant be invariably given, and its botanical Latin name subjoined, if possible, that the particular plant treated of may be unmistakably recognized.

In the report of such observations, the following particulars should be especially attended to:—First. Whether the plant in question produced honey only, or pollen only, or propolis only, or both of the former, or all three together. Second. The quality and quantity of the product yielded. Third. Whether the honey obtained is procured as nectar from the blossoms, or as honey-dew from the leaves or glands of the plants; and whether the honey-dew is the product of aphides or an exudation of vegetable juices. Fourth. The time of blossoming of the plant, and, if practicable, the kind of soil in which it grows, should be noted.

DR. ASMUSZ.

For the American Bee Journal.

Two Queens in an Observing Hive.

There are a great many bee-keepers who are kept in ignorance of the habits of the bees for the want of proper hives.

The Langstroth hive I consider the best for practical purposes now in use. There is no hive equal to the Langstroth Observing Hive. It enables one to see all the changes that the bee is subject to. By the assistance of an observing hive, I have, within the last two months, had an opportunity of witnessing the building of a queen cell, and the raising of a young queen.

On the 17th of August, 1866, I took a frame from the Langstroth hive, and transferred it to an observing hive. I then watched it closely, and on the 6th of October I saw the young queen emerge from her cell. I was anxious to see how the old queen would receive her. I was not long kept in suspense, for the young queen was very active, and frequented every part of the hive in a short time, frequently coming in contact with the old queen, who received her very kindly. The young queen is a fine specimen, and I am anxious to see if the two will be permitted to remain in the same hive.

The young queen was fecundated on the 17th of October, and on the 20th she commenced laying eggs. From that time to the present both are laying eggs incessantly, depositing a great many outside of the cells, which they necessarily must for the want of brood cells.

My hive has no drone cells, but there have been drones raised in the worker cells up to this time. They, of course, were mere dwarfs.

J. W. H.

SALEM, N. C., Oct. 26, 1866.

THE goodness of a hive is determined by its weight; a hive of twenty-five pounds may be considered excellent if in the months of February or March; if in September or October, it is then but of a secondary character.—*Huish.*

IN winter the bees occupy the top of the hive; in spring and summer they occupy the middle and the bottom.—*Ibid.*